



**National
Transportation
Safety Board**

Conrail Freight Train Derailment with Vinyl Chloride Release

Paulsboro, New Jersey

November 30, 2012

Paul L. Stancil, Investigator-in-Charge

Mantua Creek

Tank Car 10:
DOT-105
Vinyl Chloride
Punctured

Tank Car 12:
DOT-105
Vinyl Chloride
Not Punctured

Tank Car 8:
DOT-111
Ethanol
Not Punctured

Tank Car 9:
DOT-105
Vinyl Chloride
Not Punctured

Tank Car 11:
DOT-105
Vinyl Chloride
Not Punctured



← **Direction of travel**

Injuries and Damages

- Emergency responders and residents exposed to vinyl chloride
- 28 residents treated at hospitals
- \$451,000 equipment damage
- \$30 million emergency response



PHILADELPHIA INTERNATIONAL AIRPORT

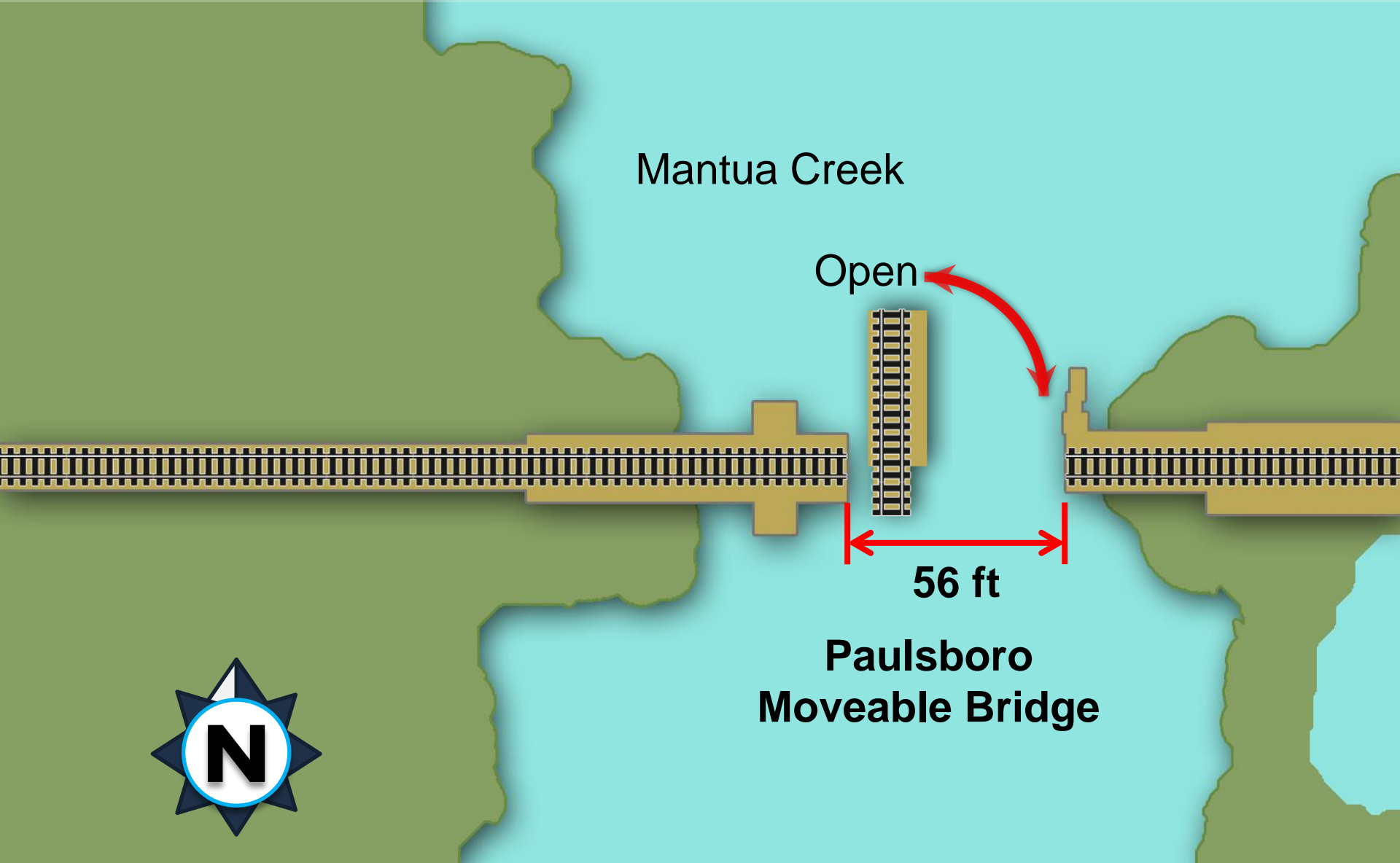
An aerial photograph showing the Philadelphia International Airport at the top, with its runways and taxiways. Below the airport is the Delaware River. Further south, the Paulsboro area in New Jersey is visible, featuring industrial facilities with numerous storage tanks and a residential area. A red oval highlights the Paulsboro Moveable Bridge, which crosses the Delaware River. A red dot is placed on the river just upstream from the bridge. The text 'PAULSBORO, NJ' is located below the bridge, and 'PAULSBORO MOVEABLE BRIDGE' is written across the bridge itself. A yellow diamond marker is placed on the bridge. The text 'DELAWARE RIVER' is written along the river. The text 'PHILADELPHIA INTERNATIONAL AIRPORT' is written above the airport.

DELAWARE RIVER

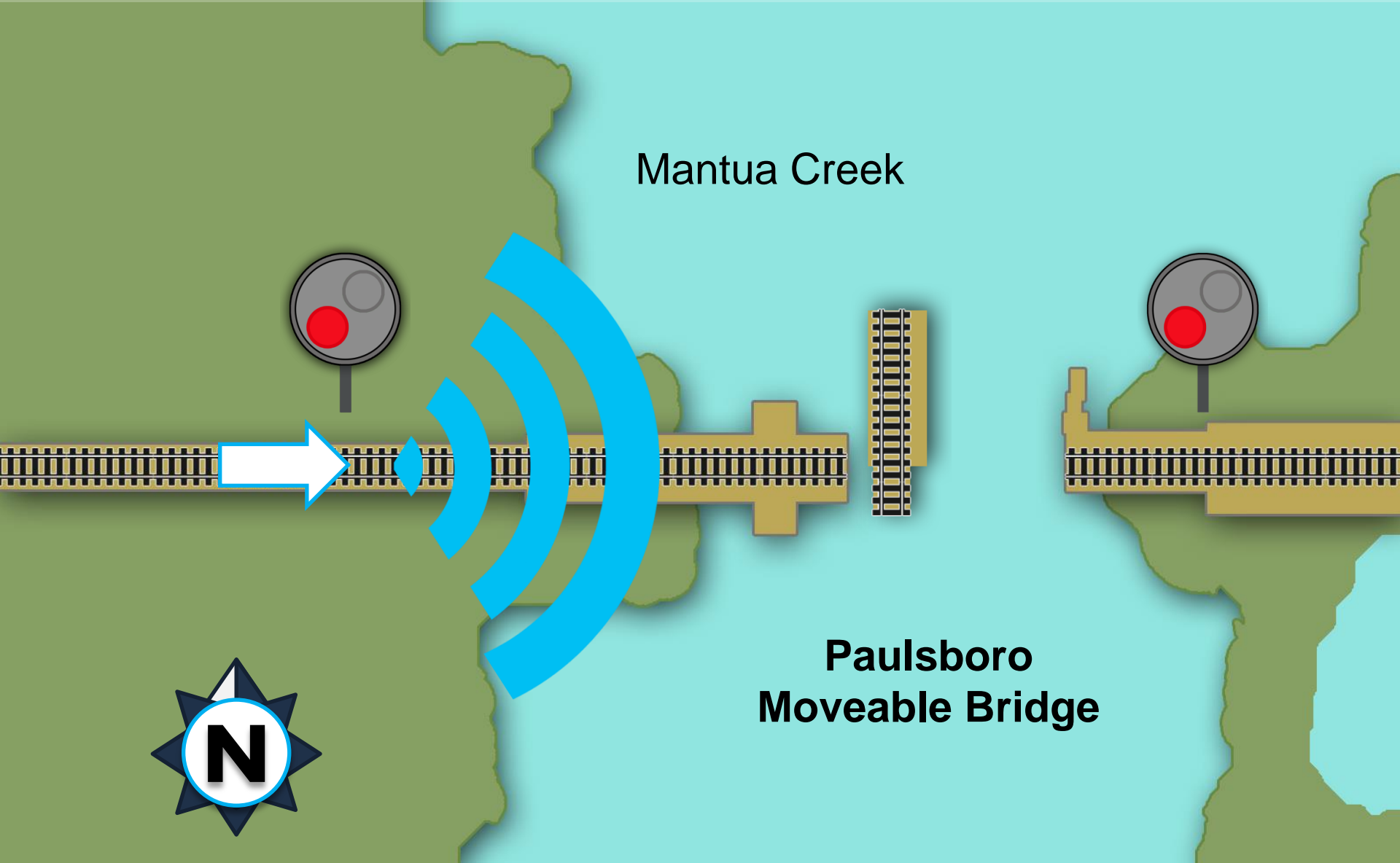
PAULSBORO MOVEABLE BRIDGE

PAULSBORO, NJ

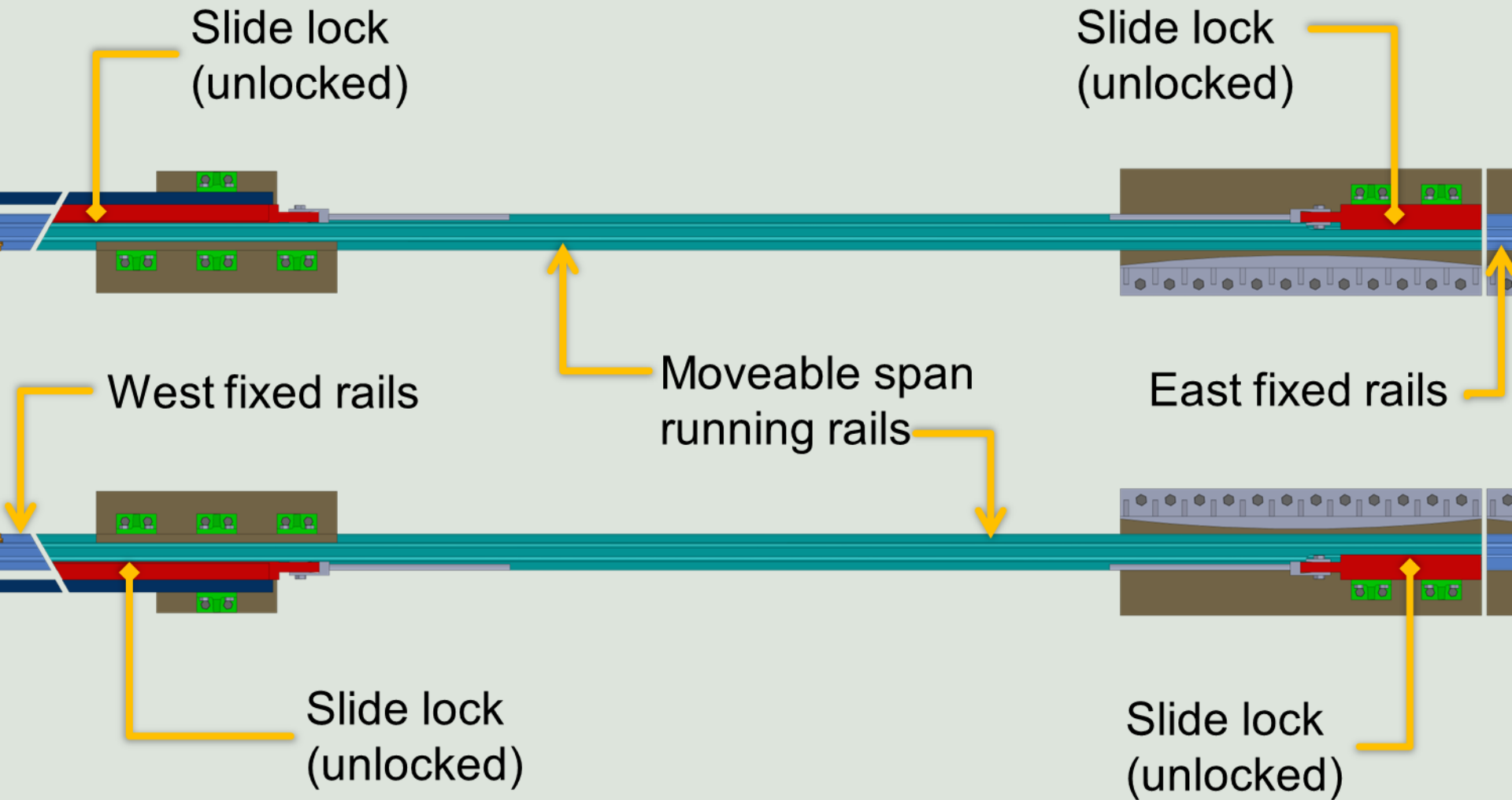
March 2 - December 1



March 2 – December 1



Slide Lock Operation



Slide Lock Operation

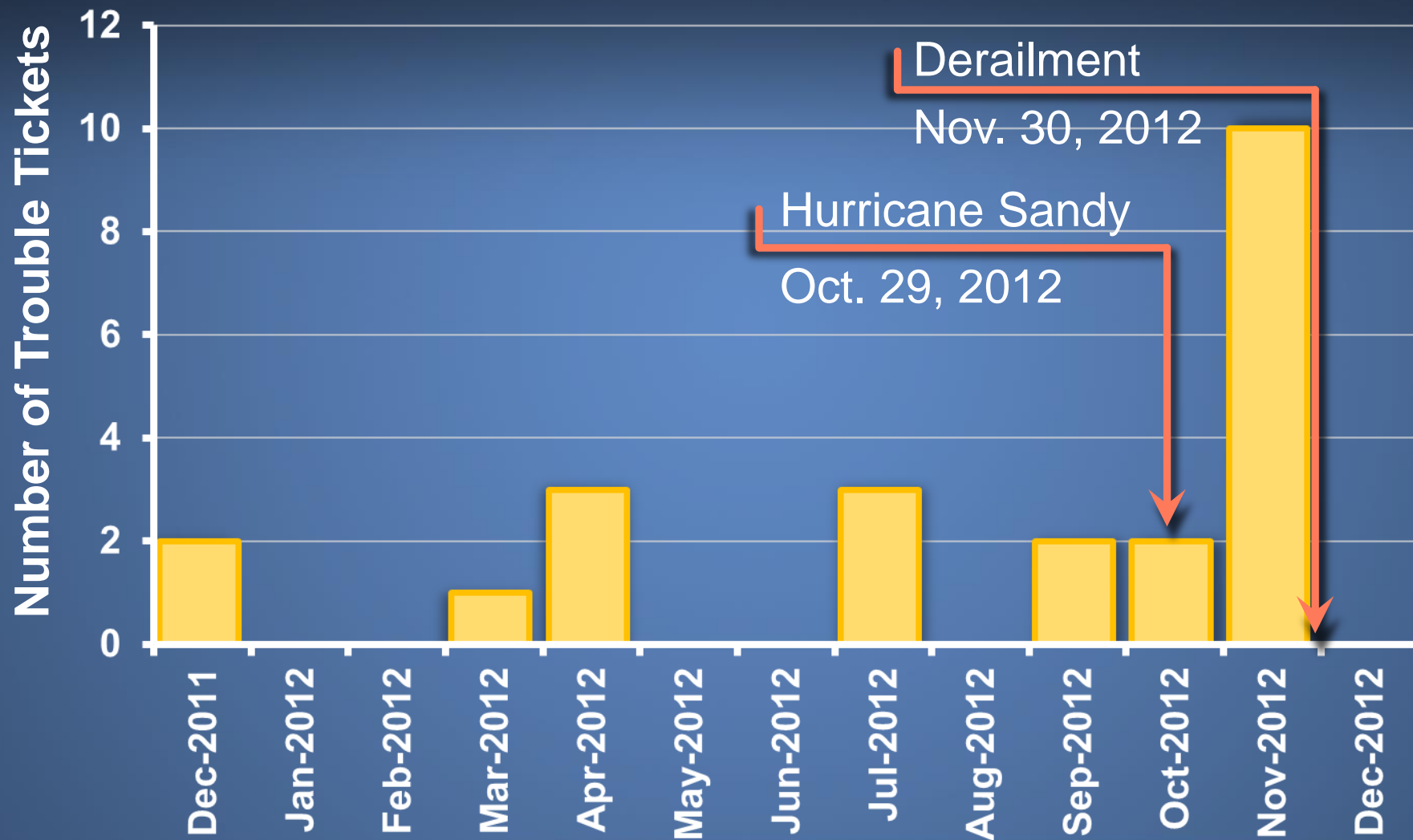
Moveable span
running rail

Slide lock
(locked)

Proximity sensor

Fixed rail

Bridge Operation Problems



East end

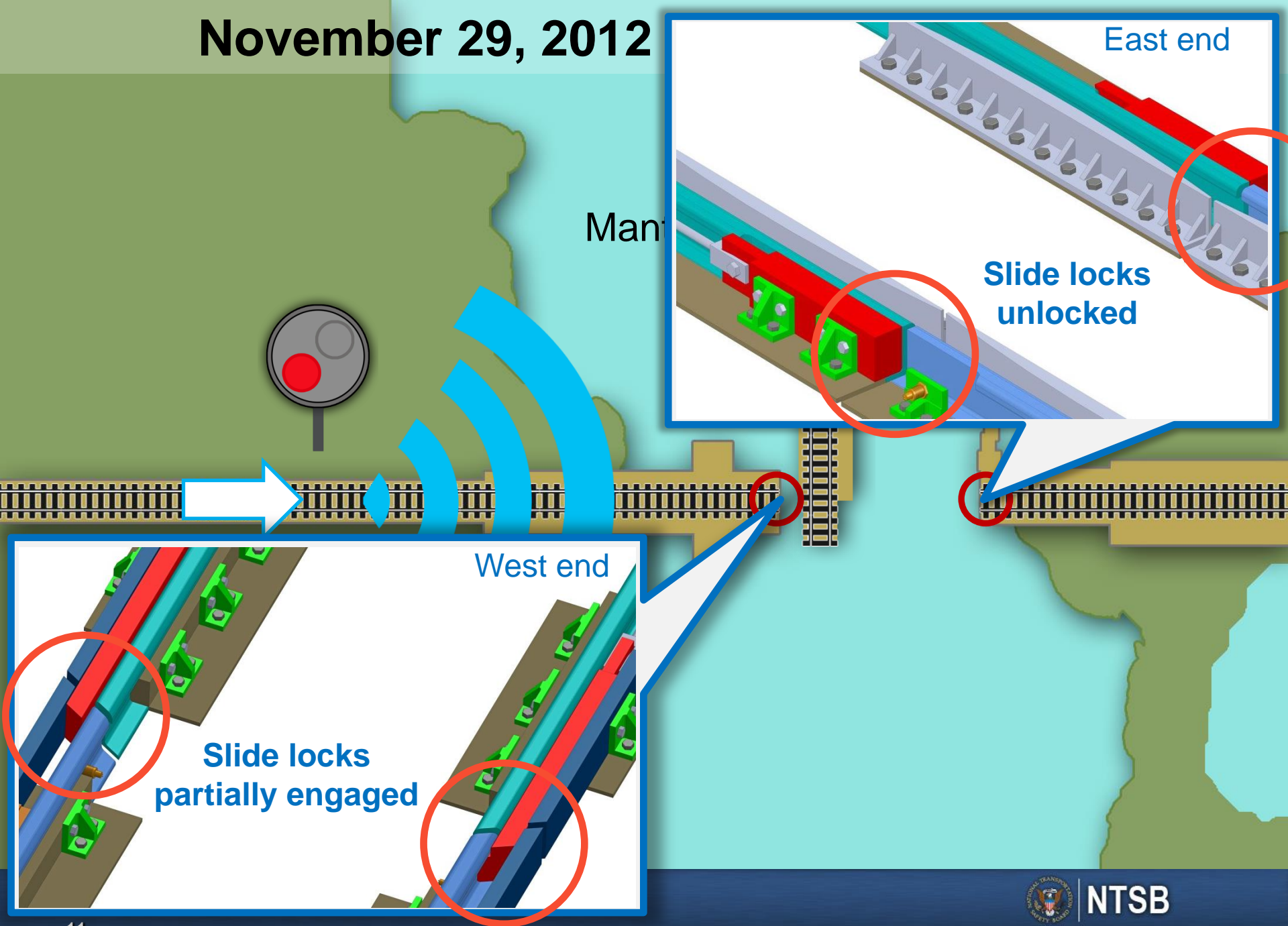
012 - about 3:00 a.m.

Gap

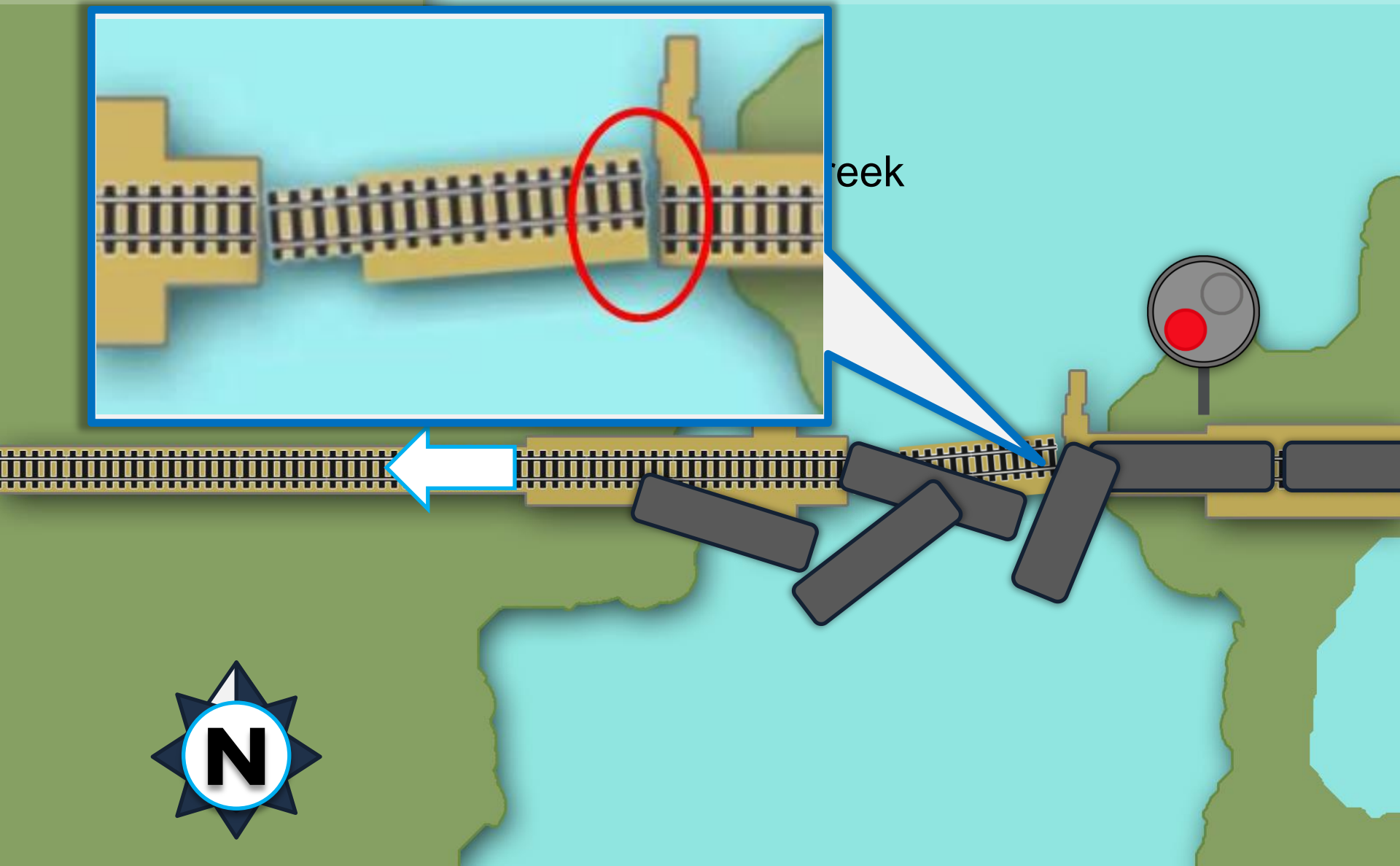
Mantua Creek



November 29, 2012



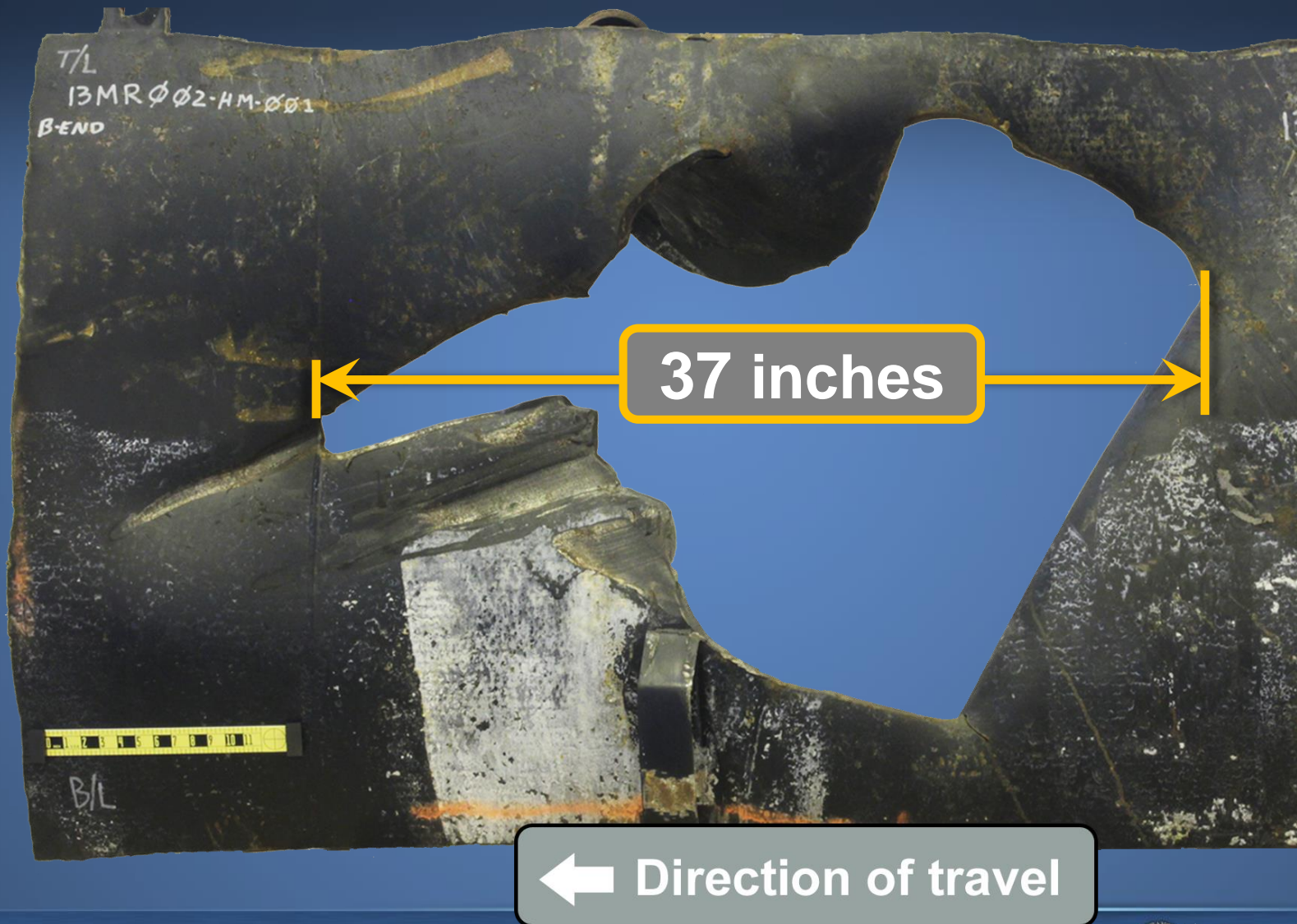
November 30, 2012 - 6:52 a.m.



November 30, 2012 - 7:02 a.m.



Punctured Tank Car



Emergency Response

- Initial notification
- First responders staged in “hot zone”
- No respiratory protection used
- Unified command established after 6 hours

Investigative Hearing July 9-10, 2013

- Conrail bridge operations
- Initial emergency response
- Hazardous materials incident management
- State and federal emergency response actions

Safety Issues

- Qualification of bridge inspectors
- Conrail safety management
- Hazardous materials communications
- Hazardous materials response protocols
- Firefighter training and qualifications
- Emergency planning and preparedness
- Rail corridor risk management

Proposed Safety Recommendations

- U.S. Department of Transportation
- Federal Railroad Administration
- Consolidated Rail Corporation
- Association of American Railroads
- American Short Line and Regional Railroad Association
- International Association of Fire Chiefs
- National Volunteer Fire Council
- New Jersey State Agencies

Reiterated Recommendations

- Federal Railroad Administration
- Pipeline and Hazardous Materials Safety Administration

Investigation Team

- Paul Stancil Investigator-in-Charge
- James Southworth On-scene IIC
- Tim DePaepe Signals
- Rick Downs Emergency Response
- Muhamed El-Zoghbi Hazardous Materials and
Emergency Response
- Joe Epperson Materials Laboratory
- Gena Evans Editor
- Cy Gura Track and Structures

Investigation Team - continued

- Joe Gregor Electrical Engineering
- Steve Jenner Human Performance
- Cassandra Johnson Recorders
- Donald Kramer Materials Laboratory
- Matt Nicholson Investigative Hearing Officer
- Mike Richards Meteorology
- Ted Turpin Operations
- Dave Watson Mechanical

Staff

- Bob Beaton
- Shannon Bennett
- Steve Blackistone
- Larry Bowling
- Alex Burkett
- Jennifer Cheek
- Stephanie Davis
- Antion Downs
- Ann Gawalt
- Georgetta Gregory
- Erik Grosof
- Richard Hipkind
- Mike Hiller
- Gary Helmer
- Mark Jones
- Nancy Mason
- Kelly Nantel
- Alice Park
- Ruben Payan
- Carl Schultheisz
- Joe Scott
- Eric Stolzenberg
- Christy Spangler
- Jane Terry
- John Vorderbrueggen
- Terry Williams

Parties to the Investigation

- Consolidated Rail Corporation (Conrail)
- Federal Railroad Administration
- Brotherhood of Locomotive Engineers and Trainmen
- International Association of Sheet Metal, Air, Rail, and Transportation Workers
- TrinityRail
- State of New Jersey



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Conrail Operating Issues

Ted Turpin

Safety Issue

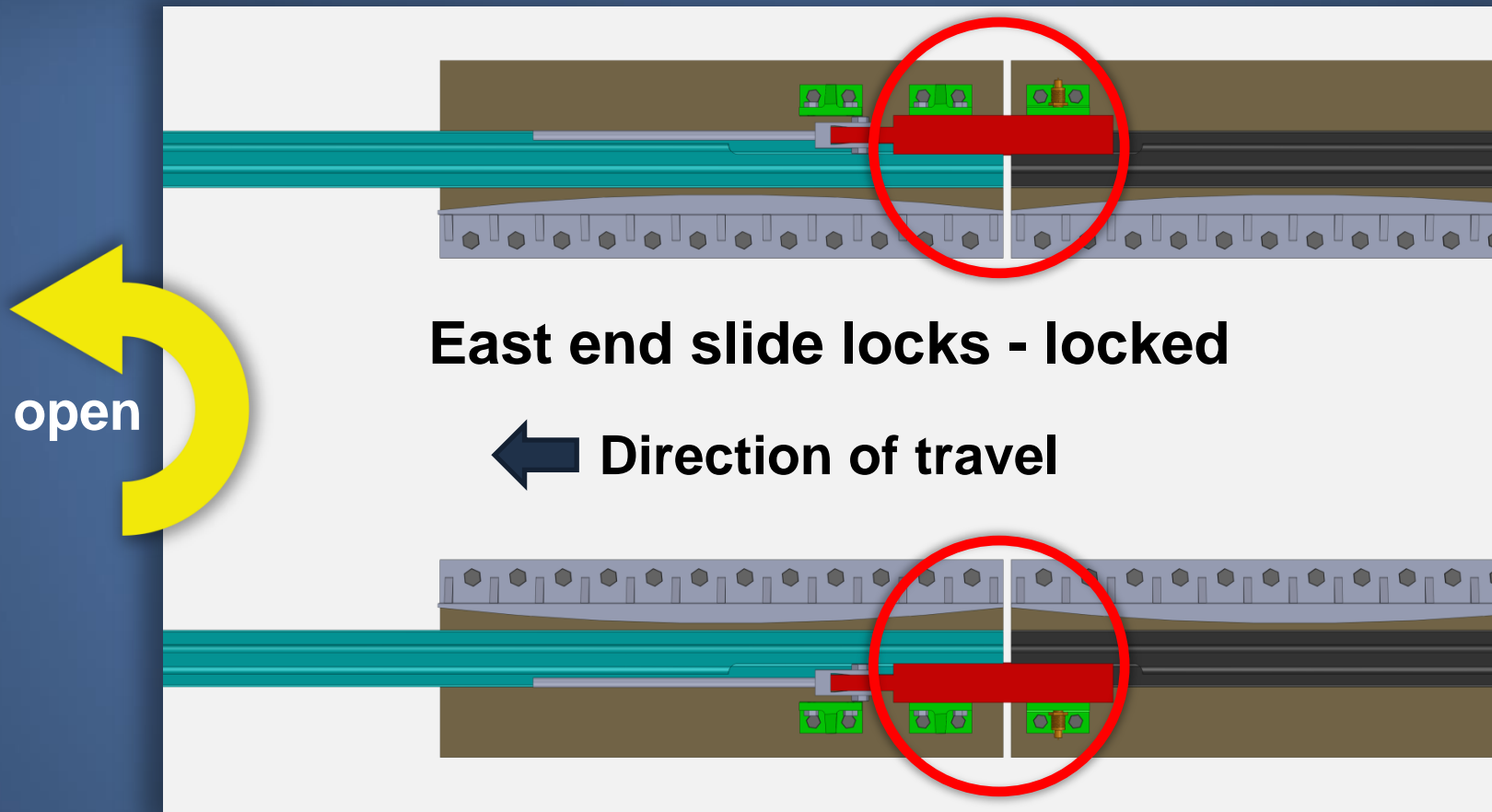
Training and qualification of train crews
for moveable bridge inspection

Conductor's Training

- Inspected with an experienced conductor four years earlier
- No formal training
- Had not inspected a bridge until accident
- Uncertain when slide locks were fully engaged
- Answers did not demonstrate knowledge

Physical Evidence on Bridge

No damage to components in circled areas



Physical Evidence on Train



Bridge Not Locked

- Inadequate training
- Uncertain answers
- No damage to slide locks
- Strike marks on wheels
- Erroneously determined locked

Conrail Training

- No specific instructions for inspecting moveable bridges
- No posters or other job aids
- Other crewmembers had no formal training
- Manager confirmed no formal instructions

Conrail Training

- No written instructions in training program
- Training comes from on-the-job
- Inspecting bridge random

Conrail Training

- Conrail did not ensure inspections by qualified employees
- Unstructured on-the-job training
- Did not prepare crews

Conrail Postaccident Actions

- No permission to pass stop signals
- Crews notify dispatcher
- Dispatcher informs trouble desk
- Notify maintenance department
- No longer rely on operating crews

FRA Safety Advisory

- Evaluate the design of moveable bridges
- Evaluate operating rules for stop signals
- Review the adequacy of all training
- Encouraged railroads to take corrective action

FRA Safety Advisory

- Operating employees could be qualified
- Qualified employee was not defined
- No specific training was described
- FRA does not track implementation
- FRA does not enforce

Existing Regulation for Passing over a Broken Rail (49 CFR 213.7(d))

- Minimum experience
- Requires training with examinations
- Periodic requalification
- Establishes specific subjects
- Requires watching and be prepared to stop the train
- Enforceable by FRA



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Hazardous Materials Emergency Response

Muhamed El-Zoghbi

Issue Areas

- Hazardous Materials Communications
- Emergency Response Protocols
- Community Protective Action Measures
- Community Awareness Programs and Emergency Response Planning
- Oversight of Emergency Operations Plans
- Hazardous Materials Routing and Risk Analysis

Hazardous Materials Communications

- Responders need train consists to identify, locate, and secure hazardous materials
- Train consist not immediately available to responders at all times
- Conrail retained possession for 3.5 hours

009 OCPX 080323 L PEDRICKT NJ NS

* HAZARDOUS *
* MATERIALS *

131 OXY VINY 4905792 T907

1 CAR

1 TNK

UN1086

VINYL CHLORIDE,
STABILIZED

2.1

RQ (VINYL CHLORIDE)

TN=VINYL CHLORIDE

EMERGENCY CONTACT:

OCCIDENTAL CHEMICAL CORP

8004249300

HAZMAT STCC=4905792

VINYL CHLORIDE,

HAZARDOUS MATERIAL HAZARD

OUS MATERIAL ID=OXYCHEM

0000001UNT CARLOAD

OCPX 80323 GAL CP= 24650

FROM/SHIPPER:

CSXTCRSP

**Emergency
Contact
Number**

**Position
in Train**

**Tank
Car
Number**

**Identity
of
Chemical**

**Maximum
Quantity**

TO/CONSIGNEE:
OXY VINY
PEDRICKTOWN

NJ

DIVISION 2.1 (FLAMMABLE GAS) >NO MORE THAN 2 CAR CUTS<
IF BAD ORDERED NOTIFY SHIPPER
LOADED TANK CAR.

010 OCPX 080234 L PEDRICKT NJ NS

* HAZARDOUS *
* MATERIALS *

131 OXY VINY 4905792 T907

1 CAR

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✓

Hazardous Materials Communications

- Instructions to crews may be contributing to delays in emergency information
- Railroad emergency response information inconsistent with and not as protective as Emergency Response Guidebook

Hazardous Waste Operations and Emergency Response (HAZWOPER)

- Emergency responders knew uncontrolled hazardous materials release occurred
- OSHA HAZWOPER standard, 29 CFR 1910.120, requires:
 - Site assessment
 - Appropriate emergency operations
 - Personal protective equipment





Initial Command Post location

Hazardous Waste Operations and Emergency Response (HAZWOPER)

- Responders exposed to vinyl chloride
- Other local and state agencies failed to comply with HAZWOPER standard
- Citations for violations were issued

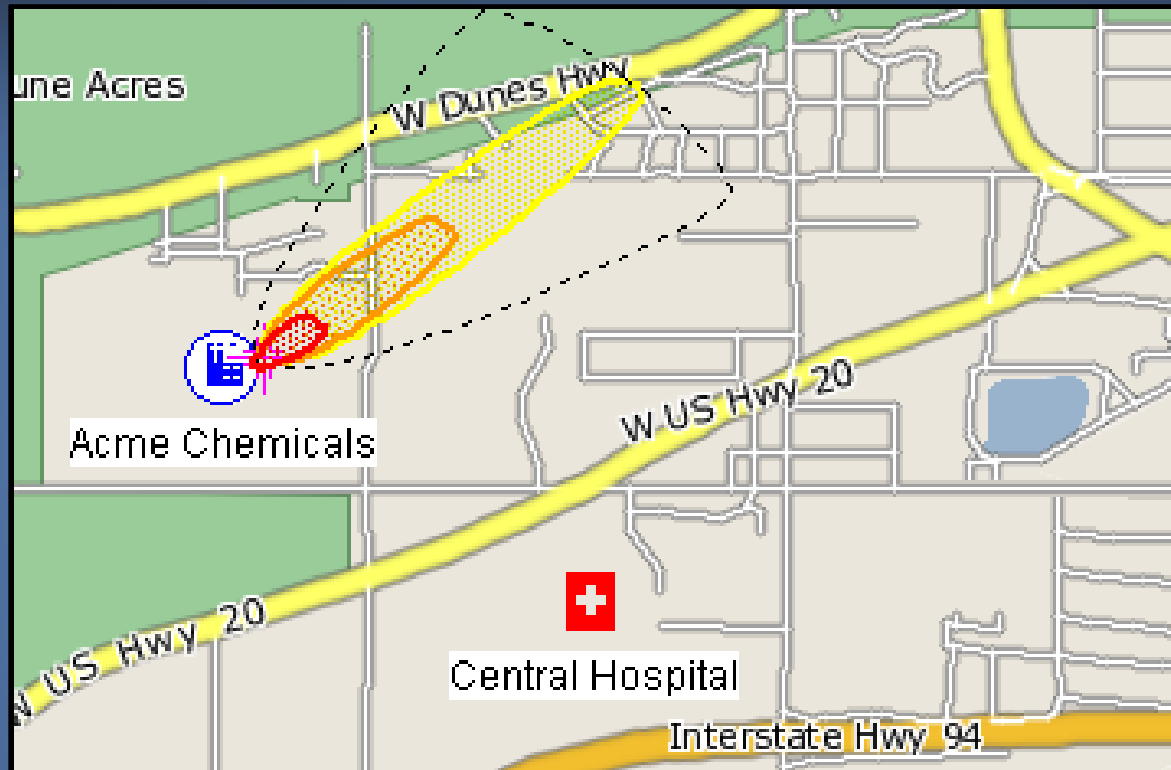
Community Protective Action Measures

- Initial evacuation and shelter-in-place decisions based on erroneous reports
 - Liquefied petroleum gas vs. vinyl chloride
 - Vapor cloud reported “nontoxic”
- Inadequate measures to correct errors and misinformation

Community Protective Action Measures

- Fact-based decisions regarding community exposure did not occur
- Estimate endangered area and potential harm to community
- Determine concentrations of released hazardous material within area

Example ALOHA Model



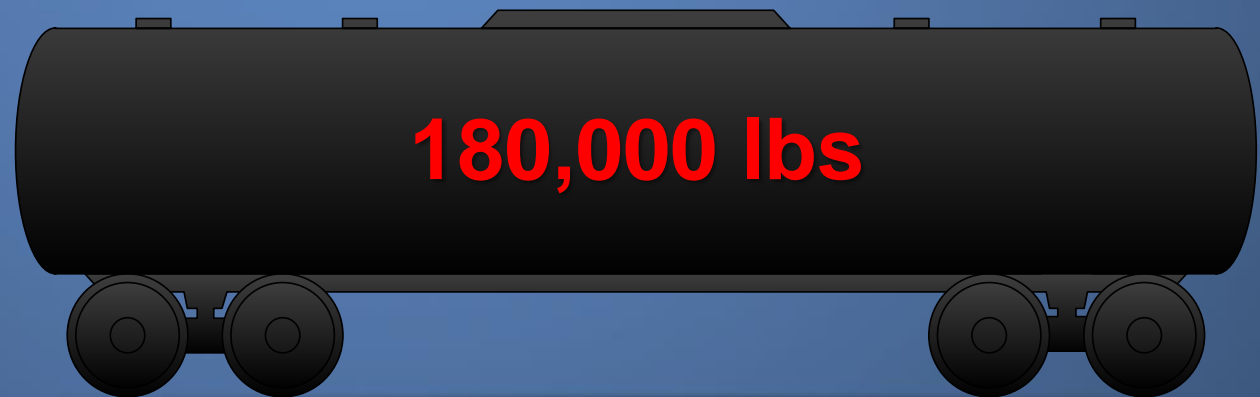
Red, orange, and yellow zones indicate where specific level of concern thresholds exceeded

Community Awareness Programs and Emergency Response Planning

- Responders and community unfamiliar with hazardous materials routinely transported through Paulsboro
- Railroad community awareness is voluntary
- Communities unprepared for hazardous materials transiting their neighborhoods

Community Awareness Programs and Emergency Response Planning

- Fixed facility threshold planning quantities often lower than quantities transported by rail
- **Chlorine**
 - Fixed facility: 100 lbs (a cylinder) - Planning required
 - Rail: tank car (180,000 lbs) – No planning required



Oversight of Emergency Operations Plans (EOP)

- Emergency Operations Plans:
 - Assign responsibility and set lines of authority
 - Describe how people will be protected
 - Identify resources for response
- In New Jersey - EOP recertification every 4 years
- Paulsboro EOP was 2 years past due recertification

Oversight of Emergency Operations Plans (EOP)

- State relies on counties to conduct reviews
- No audits or procedures to verify capabilities
- Many municipalities are non-compliant
- Inadequate accountability for non-compliance

Routing and Risk Analysis

- Rail Corridor Risk Management System (RCRMS) software is inadequate for shortline railroads
- RCRMS does not assess risk when alternate routes are unavailable
- Conrail aware of shortcomings and failed to conduct thorough risk assessment



National Transportation Safety Board